

# **APPENDIX M**

## **Cost Estimating and Economic Criteria**



This appendix contains information on the origination of several of the cost estimations for the water source options and treatment technologies presented in this plan.

A memo (**Exhibit 1**) summarizes the approach on the origination and updated cost information presented in the KB Planning Document. The approach discussed in this memo is supported by the Florida Department of Environmental Protection (FDEP) and the water management districts. The cost information provides a consistent set of definitions and criteria for the development of comparable planning level, life cycle, cost estimates for water supply and wastewater treatment alternatives.

**Exhibit 1. Cost Estimating and Economic Criteria for 2005 District Water Supply Plan.****TECHNICAL MEMORANDUM****CH2MHILL****Cost Estimating and Economic Criteria for 2005  
District Water Supply Plan**

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**Purpose**

This technical memorandum (TM) provides cost definitions and cost estimating and economic criteria to be used in the development of water supply facilities costing for the 2005 District Water Supply Plan (DWSP). These criteria will be applied to all cost estimates and economic comparisons developed as part of the 2005 DWSP to ensure that all costs are directly comparable.

This TM provides a consistent set of definitions and criteria for the development of comparable planning level life cycle cost estimates for all water supply alternatives.

**Definitions**

The following definitions will be used in the 2005 DWSP project and should be adhered to when applicable. For the most part, these definitions are the same as used by SJRWMD, as well as by Southwest Florida Water Management District (SWFWMD), in the development of the initial DWSPs.

**Construction Cost**

The construction cost is the total amount expected to be paid to a qualified contractor to build the required facilities at peak design capacity.

**Non-construction Capital Cost**

Non-construction capital cost is an allowance for construction contingency, engineering design, permitting and administration associated with the constructed facilities.

**Land Cost**

The market value of the land required to implement the water supply option.

**Exhibit 1. Cost Estimating and Economic Criteria for 2005 District Water Supply Plan  
(Continued).**

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**Land Acquisition Cost**

The estimated cost of acquiring the required land, exclusive of the land cost.

**Total Capital Cost**

Total capital cost is the sum of construction cost, non-construction capital cost, land cost, and land acquisition cost.

**Operation and Maintenance Cost**

The estimated annual cost of operating and maintaining the water supply option when operated at average day capacity.

**Equivalent Annual Cost**

Total annual life cycle cost of the water supply option based on service life and time value of money criteria established for this project. Equivalent Annual Cost accounts for Total Capital Cost and O&M costs with facility operating at average day design capacity.

**Present Worth**

The equivalent present value of current and future expenditures for a specified planning period.

**Unit Production Cost**

Equivalent Annual Cost divided by annual water production. The Unit Production Cost will be expressed in terms of dollars per 1,000 gallons.

**Criteria**

Cost estimating and economic criteria are guidelines for estimating costs associated with water supply options.

**Peak Flow Ratio**

Capital cost of water supply facilities will be based on maximum installed capacity designed to accommodate peak or maximum daily flow (MDF) requirements. O&M costs and annual water production are based on the average daily flow (ADF) produced. The peak flow ratio (MDF/ADF) for an individual water supply system depends on the demand characteristics of the service area. For public supply systems the peak ratio is generally at least 1.25 for large systems and can be greater than 2.0 for small systems.

For water supply options where the service area peak flow ratio is known, the known value can and should be used in the cost estimating and economic calculations. For regional planning applications, a peak ratio of 1.5 will be used. This MDF/ADF ratio was applied in the 2000 DWSP.

**Exhibit 1. Cost Estimating and Economic Criteria for 2005 District Water Supply Plan  
(Continued).**

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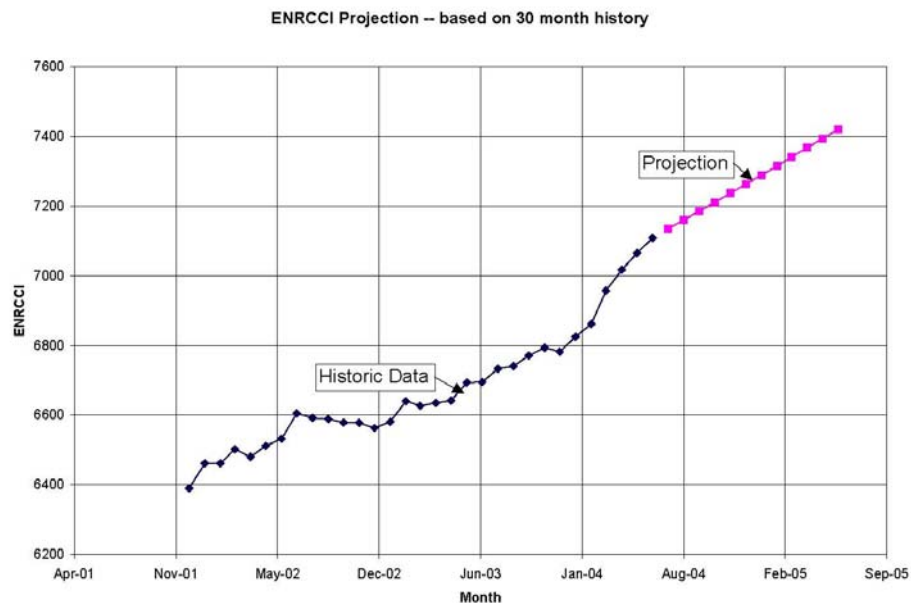
### Cost Index

Engineering News Record (ENR) publishes a Construction Cost Index (CCI) that can be used to adjust the cost basis of a given construction project for past and future times. The ENRCCI is based on the following construction items: 200 hours of common labor at the 20-city average of common labor rates, plus 2,500 pounds of standard structural steel shapes at the mill price prior to 1996 and the fabricated 20-city price from 1996, plus 1.128 tons of Portland cement at the 20-city price, plus 1,088 board-ft of 2 x 4 lumber at the 20-city price.

Cost estimates, for the 2005 DWSP, will be expressed in estimated year 2005 dollars. Because much of 2005 DWSP cost estimating work will be completed prior to 2005, projection of the current ENRCCI (June 2004 ENRCCI = 7,109) to mid-year 2005 ENRCCI is required.

Basic construction materials costs have increased significantly in the first 6 months of 2004 and this recent history is included in the mid-year 2005 ENRCCI projection. Exhibit 1 shows the recent monthly historic ENRCCI trend, as well as monthly projections through June 2005. The projected ENRCCI for June 2005 is approximately 7,420. This projection is based on the observed mean monthly growth rate (0.357%) for the 30-month period from January 2003 through June 2004.

**EXHIBIT 1**  
ENRCCI Projection to 2005  
*Cost Estimating & Economic Evaluation Criteria*



DWSP 2005 COST ESTIMATING CRITERIA TM 062404 FINAL.DOC

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**Exhibit 1. Cost Estimating and Economic Criteria for 2005 District Water Supply Plan  
(Continued).**

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The cost basis for the 2000 DWSP was March 1996 with a corresponding ENRCCI value of 5,537. Using the projected mid-year 2005 ENRCCI value of 7,420 represents an increase in the cost basis of about 34 percent.

The conceptual planning level cost estimates prepared for the 2004 Interim Update DWSP projects are expressed on an April 2003 cost basis with a corresponding ENRCCI value of 6,635. Therefore, the cost basis for the 2005 DWSP will be approximately 11.8 percent greater than the cost basis for the 2004 Interim Update.

**Non-construction Capital Cost**

Non-construction capital cost will equal 45% of the planning level estimated construction cost. This includes a 20% allowance for construction contingency and a 25% allowance for engineering design, permitting, and administration. This value is unchanged from the 2000 DWSP.

**Land Cost**

Unit land cost (\$/acre) for each parcel are based upon land use classification and size as supplied by SJRWMD land acquisition staff for the 2000 DWSP. An evaluation of current land values, as per recent SJRWMD land purchases, did not provide an adequate basis for revising the 2000 DWSP values. If actual site-specific land values are available for a given parcel and water supply option the site-specific value should be used in lieu of these typical regional values.

General land use classifications include urban, suburban, and rural. Size is based on acreage, where *small* refers to parcels 50 acres or less in size and *large* refers to parcels greater than 50 acres in size. Exhibit 2 provides the unit land cost matrix for parcels located within SJRWMD.

**EXHIBIT 2**

Unit Land Cost for Parcels  
*Cost Estimating & Economic Evaluation Criteria*

Land Use Classification	Parcel Size	
	Small (< or = 50 acres)	Large (> 50 acres)
	(\$/acre)	(\$/acre)
Urban	\$ 100,000	N/A
Suburban	\$ 20,000	\$ 10,000
Rural	\$ 5,000	\$ 3,000

Unit land costs (\$/ft<sup>2</sup>) for pipeline corridors vary based on the land use classification and whether or not the parcel is adjacent to public right of way (ROW) or in an undeveloped (new) area, and whether an easement or full ROW is required. Exhibit 3 provides the unit

**Exhibit 1. Cost Estimating and Economic Criteria for 2005 District Water Supply Plan  
(Continued).**

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cost matrix for pipeline corridors located within SJRWMD. These values are the same as used in the 2000 DWSP.

**EXHIBIT 3**  
Unit Land Cost for Pipeline Corridors  
*Cost Estimating & Economic Evaluation Criteria*

Land Use Classification	Adjacent to Public ROW		New Area	
	Easement	ROW	Easement	ROW
	(\$/ft <sup>2</sup> )	(\$/ft <sup>2</sup> )	(\$/ft <sup>2</sup> )	(\$/ft <sup>2</sup> )
Urban	\$ 4.00	\$ 6.00	\$ 3.00	\$ 5.00
Suburban	\$ 1.50	\$ 3.00	\$ 1.00	\$ 2.00
Rural	\$ 0.75	\$ 1.00	\$ 0.50	\$ 0.75

### Land Acquisition Cost

Land acquisition cost estimates will vary as a function of condemnation requirements, as follows:

- 12% of land value for known non-condemnation parcels
- 25% of land value for know condemnation parcels
- 18% of land value where condemnation status is unknown

In most case, at the conceptual regional planning level of analysis, it is anticipated that condemnation status will be unknown and therefore the 18% value will apply. A single value of 25% was used in the 2000 DWSP.

### Interest Rate

For the 2005 DWSP, the interest rate to be used in all economic analysis calculations will be the current (FY04) federal water resources planning rate. This rate, set annually by the US Bureau of Reclamation for use by all federal agencies, is based on US Treasury bond rates. Although it is adjusted annually, it cannot be changed by more than ¼ percent in any single year. The current (FY04) federal planning rate, as published in the Federal Register (April 26, 2004), is 5.625 % per annum. This value will be used in all economic calculations for the 2005 DWSP.

The interest rate used in the 2000 DWSP was 7 % per annum. A value of 6 % was used in the 2004 Interim Update DWSP. Since that time the Federal water resources planning discount rate has been chosen as the interest rate criterion for water supply planning.

### Economic Life of Facilities

The economic service life of facilities is based on the criteria used in the 2000 DWSP. Exhibit 4 provides the economic service life, in years based on component type. These values will be used in all annual cost and present worth calculations.



**Exhibit 1. Cost Estimating and Economic Criteria for 2005 District Water Supply Plan**  
(Continued).

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In all cases, land is considered a permanent resource and therefore has an infinite service life.

**EXHIBIT 4**  
Economic Service Life  
*Cost Estimating & Economic Evaluation Criteria*

Component Type	Service Life (years)
Water Conveyance Structures (pipelines, collection and distribution systems)	40
Other Structures (buildings, tankage, site improvements, etc.)	35
Wells	30
Process and Auxiliary Equipment (treatment equipment, pumps motors, mechanical equipment, etc.)	20
Reverse Osmosis Membranes	5

The non-construction capital costs associated with a given project, or major project component, will also be distributed in proportion to expected service life of the project. For example, if a given project, or major project component, has an economic service life of 20 years then the non-construction capital cost for that project, or major project component, also has an economic service life of 20 years.

**Present Worth**

A 20-year planning period will be used in present worth calculations. This present worth planning period was also used in the 2000 DWSP.

**Summary**

Generally, definitions and cost estimating and economic criteria applied to the 2005 DWSP will be the same as those applied to the 2000 DWSP. The main exceptions are the cost basis, the land acquisition cost factor and the interest rate.

All 2005 DWSP costs will be estimated year 2005 costs; whereas, the 2000 DWSP was developed using March 1996 costs. The cost basis for the 2004 Interim Update DWSP was April 2003.

The second change is the land acquisition factor. Land acquisition costs were estimated as 25% of land value for the 2000 DWSP. For the 2005 DWSP, this factor will vary depending upon condemnation status.

The final change is the interest rate used in the economic calculations. An interest rate of 7% was used for the 2000 DWSP and an interest rate of 6% was used for the 2004 Interim

**Exhibit 1** Cost Estimating and Economic Criteria for 2005 District Water Supply Plan  
(Continued).

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Update DWSP. An interest rate of 5.625% will be used for the 2005 DWSP. The 2005 DWSP interest rate is equal to the current (FY04) Federal water resources planning rate.

All other definitions and criteria remain unchanged.

## REFERENCES CITED

St. Johns River Water Management District. 2004. *Cost Estimating and Economic Criteria for 2005 District Water Supply – Technical Memorandum*. CH2M Hill. Palatka, FL.

